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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/207,972	12/09/1998	MARK I. GARDNER	5500-36100	7507

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EXAMINER	
WARREN, MATTHEW E	
ART UNIT	PAPER NUMBER
2815	16

DATE MAILED: 11/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/207,972	GARDNER ET AL.	
	Examiner	Art Unit	
	Matthew E. Warren	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 August 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *24-29,32 and 33* is/are allowed.

6)☒ Claim(s) *16-21,23,30 and 31* is/are rejected.

7)☒ Claim(s) *22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *15* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This Office Action is in response to the Remarks filed on August 23, 2002.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 16-19 , 21, 23, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kizilyalli et al. (US 6,320,238 B1) in view of Wu (US 5,880,508).

Kizilyalli et al (fig. 1) a semiconductor device comprising a semiconductor substrate (1) and low trap density oxide layer (102) formed on the substrate (col. 6, lines 49-55). A high dielectric constant film (103), such as the metal oxide tantalum pentoxide, is formed on the oxide layer. Ta_2O_5 has a dielectric constant of which is greater than 5 or 20 as cited in the applicant's claimed invention. A gate conductor (104) is arranged on the high dielectric constant film. The silicon oxide film is less than 10 angstroms thick (col. 4, lines 31-34). Kizilyalli et al. shows all of the elements of the claims except the low trap density layer (oxide layer) having nitrogen which Wu discloses (col. 1, lines 38-43) to reduce leakage currents in the layer. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the low trap density layer of Kizilyalli et al by adding nitrogen as taught by Wu to suppress leakage current in the layer.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kizilyalli et al. (US 6,320,238 B1) in view of Wu (US 5,880,508) as applied to claim 16 above, and further in view of Chou (US 5,994,734).

over Kizilyalli in view of Wu shows all of the elements of the claims except the additional gate dielectric and gate conductor formed between the nitrogen-containing oxide and the substrate. Chou shows (figs. 3f, 3g) a semiconductor device having an additional gate conductor layer (23) and a gate dielectric (22) formed between a dielectric stack and the substrate (20) to form a non volatile memory device. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor device of over Kizilyalli in view of Wu by adding an additional gate conductor and dielectric as taught by Chou to form a non volatile memory device.

Allowable Subject Matter

Claim 22 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 24-29, 32, and 33 are allowed.

The following is an examiner's statement of reasons for allowance: the prior art references, alone or in combination, do not show a semiconductor device having the combination of a low trap density nitrogen containing oxide on a semiconductor substrate, the nitrogen containing oxide having a thickness less that 10 Angstroms and

high-K dielectric on the nitrogen containing oxide, wherein the high-K dielectric has thickness less than 10 Angstroms also.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed with respect to claims 16-23, 30, and 31 have been fully considered but they are not persuasive. The applicant primarily asserts that cited references do not show all of the elements of the claims, specifically that Kizilyalli et al. and Wu do not show a low-trap-density nitrogen-containing oxide arranged upon an upper surface of a semiconductor substrate. The applicant also asserts that the references do not provide motivation for combining. The examiner believes that the cited references show all of the elements of the claims and provide proper motivation for combining.

With respect to the arguments that the reference do not, show all of the elements of the claims, Kizilyalli specifically discloses in column 6 lines 49-55 that the device incorporates a low trap density oxide layer. Kizilyalli is only deficient in that the low trap density layer does not contain nitrogen. Wu cures the deficiency of Kizilyalli because it is taught that a gate oxide having nitride has lower leakage current than regular oxide. Within the teachings of Wu is found the motivation also. One of ordinary skill in the art

would know that by adding nitrogen to a gate oxide layer, leakage current is reduced. Although the combined references may not use the same methods for forming the gate dielectric as disclosed in the arguments, the structural limitations of the claims are what is relied upon and thus such arguments are not relevant. Therefore, the cited references show all of the elements of the claims, they provide proper motivation, and this action is made final.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (703) 305-0760. The examiner can normally be reached on Mon-Thurs, and alternating Fri, 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

MEW

November 18, 2002

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800